

Rationale for delisting actions taken on the Louisiana Court Ordered 303(d) list

Actions taken on this list largely affect only one or two separate causes for listing and result in only very limited removal of waters from the list. All actions are primarily based on new data and information that has not been previously reviewed. The sources of this new data are the Louisiana Department of Environmental Quality and EPA STORET databases. The actions taken in this action primarily are limited to changes in the listing structure for several of the causes which are duplicative or do not accurately reflect the need to develop TMDLs. It is proposed that separate listings for TSS, turbidity and siltation be combined into one listing as described below and evaluated according to the adopted indicator parameter. In addition, combined listings for salinity/TDS/chlorides/sulfate have been broken out into separate listings for TDS (salinity), chlorides, and sulfate and evaluated separately. The complete rationale for these decisions is given below.

Turbidity, TSS and Siltation

The Louisiana 1998 303(d) list contains waterbodies on the list with separate causes given as turbidity, TSS and siltation. These original assessments were based largely on the best professional judgement of LDEQ regional coordinators without the benefit of quantitative data. EPA believes that a separate listing for turbidity, TSS and sedimentation is duplicative in that the terms are often used interchangeably as different expressions of siltation concerns in the stream. [A review of the origin of these listings also provides support for this argument. Turbidity listings almost always originated from the states 305(b) or 303(d) lists while siltation and TSS originated largely from the states nonpoint source list.] EPA believes that the fact that this duplicity occurs so often supports the determination that these causes were simply different ways of expressing the same concern by different individuals.

Although turbidity and TSS describe separate physical properties there is an established water quality relationship between the two measures. In addition, Louisiana water quality standards do not establish a criterion for TSS. Total suspended solids is defined as the residue left after passing a water sample through a standard glass fiber filter and dried at 103 C for two hours. Turbidity is the measure of the optical property of water that causes light to be either scattered or absorbed. Turbidity may be influenced by a number of factors but it is primarily affected by suspended matter such as clay, silt, plankton, or microscopic organisms (APHA 1992). These would be the same components of a total suspended solids (TSS) analysis. Although turbidity may be influenced by other factors, effects due to TSS will be captured in a turbidity measure. EPA's 1999 document, *Protocol for Developing Sediment TMDLs*, discusses the need to establish quantitative indicators "that represent achievement of water quality standards and are linked to the reason for waterbody listing." In this same document EPA states that one of the most important factors in determining the indicator to be used is the existence of a numeric target. Given that there is no criterion for TSS in the Louisiana standards and that there exists a general relationship between turbidity and TSS, a listing under both parameters is duplicative.

A number of waters are included on the Louisiana court-ordered 303(d) list as impacted due to siltation. As with TSS there are no numeric guidelines or criteria for siltation and there is little or no existing information available that would allow a direct evaluation of stream substrate

conditions. For siltation, as in the previous discussion on TSS, a water column measure, or indicator, maybe used as a quantitative expression of water quality impacts (EPA 1999). A water column characteristic that has been widely used as an indicator of the potential for sediment accumulation in streambeds is suspended sediment (EPA 1999). Siltation may be described as the cumulative effect created as suspended matter from the water column settles to the stream bottom. Water column data for TSS and turbidity is available from the Louisiana water quality monitoring network.

Following the described model we would use turbidity criterion levels to establish the acceptable TSS values and from that calculate the allowable loads. In order to confirm or reject the presence of these suspected causes, EPA staff of the Watershed Management Section evaluated waterbodies for which numerical ambient data were available. 150 NTU is the guideline value in the state's water quality standards for the Mermentau and Vermilion Rivers, the major streams for the example given here. The standard's turbidity guidelines of 25 NTU for scenic streams and 50 NTU for estuarine waters were also used as appropriate. (LAC 33:IX.1123). As an example, data from the water quality station on Bayou Teche have been evaluated and plotted. This information is shown in the attachment to this document. From the raw data, only one of thirty-three data points is above the criterion value of 150 NTU. Following the procedure for establishing a relationship between TSS and Turbidity, as discussed in the EPA document *Protocol for Developing Sediment TMDLs* this data is graphically displayed with TSS on the X-axis and Turbidity on the Y-axis. Using statistical methods, a best-fit line for TSS and Turbidity pair values may be established. By drawing a vertical line from the Turbidity criterion value (150 NTU) to the point of intersection with the best-fit line, a target for TSS values may be established. That is, at the criterion value for turbidity the best-fit line would predict that the TSS target concentration is approximately 122 mg/L. Comparing the data in the table with this value only one value exceeds the TSS target. Therefore, where a water is listed for TSS, EPA Region 6 has interpreted that if the water is meeting its criterion value for turbidity that it is also meeting for TSS and a delisting for this cause is supported. Conversely, if the subsegment is listed for TSS and not turbidity, and the data show that the water quality standard for turbidity is not being met a turbidity listing will be created. Where turbidity data supports that water quality standards are not being met and that a TMDL is necessary, a TMDL will be developed that will address the underlying issue of sediment loading.

Turbidity/TSS values less than the established criterion are considered to have low potential for accumulation of sediments that would impair designated uses. We can further evaluate this by establishing an assimilative sediment load using this calculated concentration and the appropriate flow for the stream. The current load to the system can be calculated using the mean of the available TSS values. The mean of TSS in this data set is 46 mg/L or roughly one third of the target value. Therefore, if we calculate the current load using the same flow value the load will be only one-third of the allowable load for this stream. Since the assimilative capacity for sediment has not been exceeded no TMDL is necessary. Under this condition siltation will also be removed as a cause of non-support.

Salinity/TDS/Chlorides/Sulfates

Contrary to the previous discussion the list also contains a single listing for salinity/TDS/chlorides/sulfates. EPA Region 6 has determined that these single listings, with the exception of salinity, should be split into separate listings. Each of these parameters has a separate stream specific criterion that has been adopted in the State water quality standards. It is therefore appropriate to assess each of these parameters individually to make a determination if water quality standards are being met and if a TMDL is necessary for each parameter independently of the others. In establishing this list of delisting actions EPA Region 6 has evaluated available data for each of these parameters separately and is making delisting recommendations accordingly. EPA has already established TMDLs for sulfates, chlorides, and TDS in this basin in accordance with this position.

As stated above, the one exception to this are the listings for salinity. Louisiana has not adopted separate criterion for salinity for its streams. In part, to protect from unwanted salinity increases the state has adopted stream specific TDS criteria. According to Standard Methods 18th edition (APHA 1992) the measure of salinity was originally conceived as an indirect expression of the mass of dissolved salts in a given mass of solution. Total dissolved solids (TDS) is expressed as the mass of dissolved solids in a given mass of solution. Salinity was therefore developed as a quick and efficient indirect method of expressing this mass of dissolved solids (i.e. TDS). EPA Region 6 therefore proposes that there not be a separate listing for salinity but that salinity and TDS be combined as a single listing.

References

U.S. EPA. 1999. Protocol for Developing Sediment TMDLs. EPA 841-B-99-004. Office of Water (4503F), United States Environmental Protection Agency, Washington, D.C. 132 pp.

APHA. 1992. Standard methods for the Examination of Water and Wastewater. 18th Edition. American Public Health Association, Washington, D.C.

Bayou Teche

DATE	T.S.S. mg/l	TURBIDITY NTU
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12/2/98	18	40
11/18/98	84	110
11/5/98	35.3	40
10/21/98	20	45
10/7/98	32	35
9/16/98	13	38
9/2/98	40.5	32
8/19/98	35	38
8/5/98	48	40
7/22/98	54	50
7/8/98	57	55
6/17/98	57	50
5/11/98	37	60
3/9/98	20	70
1/12/98	135	162
11/17/97	22	39
9/8/97	36.9	35
7/14/97	52	70
5/12/97	24	57
3/10/97	27	45
1/6/97	25	52.5
11/18/96	56	43
9/9/96	35	30
7/8/96	36	41
5/13/96	56	68
3/11/96	94	38
1/8/96	27	45
11/14/95	32	40
9/11/95	55	24
7/10/95	104	87
5/8/95	2	40
3/14/95	120	120
1/10/95	24	55

Turbidity vs TSS for Bayou Teche

$$y = 0.7993x + 2.4044$$

$$R^2 = 0.5575$$

